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ABSTRACT

25X1

The [redacted] High Power Stereoviewer was designed to accommodate film chips up to 5 inches square. The prototype glide stages and platens allow the instrument to accept film chips up to 6.6 inches square and provides glass pressure plates for holding them.

They were tested for contractual acceptance and technical performance. In addition, an operational evaluation was performed.

It was concluded that they meet operational requirements. However, two mechanical discrepancies should be corrected in the event of additional procurement of the devices.

1. INTRODUCTION

25X1

The [redacted] Glide Stages and their respective platens were designed and fabricated by [redacted] under contract with NPIC/TSG/RED. When mounted on a [redacted] High Power Stereoviewer (HPSV), they increase the viewing area and provide glass pressure plates for holding film.

25X1
25X1

The glide stages were delivered to NPIC and received by the Test and Evaluation Branch (TEB), ESD/TSG, on 22 January 1973. TEB testing was performed during the period of 23 to 29 January 1973.

All operational components within [redacted] evaluated the glide stages during the period 29 January to 23 April 1973.

25X1

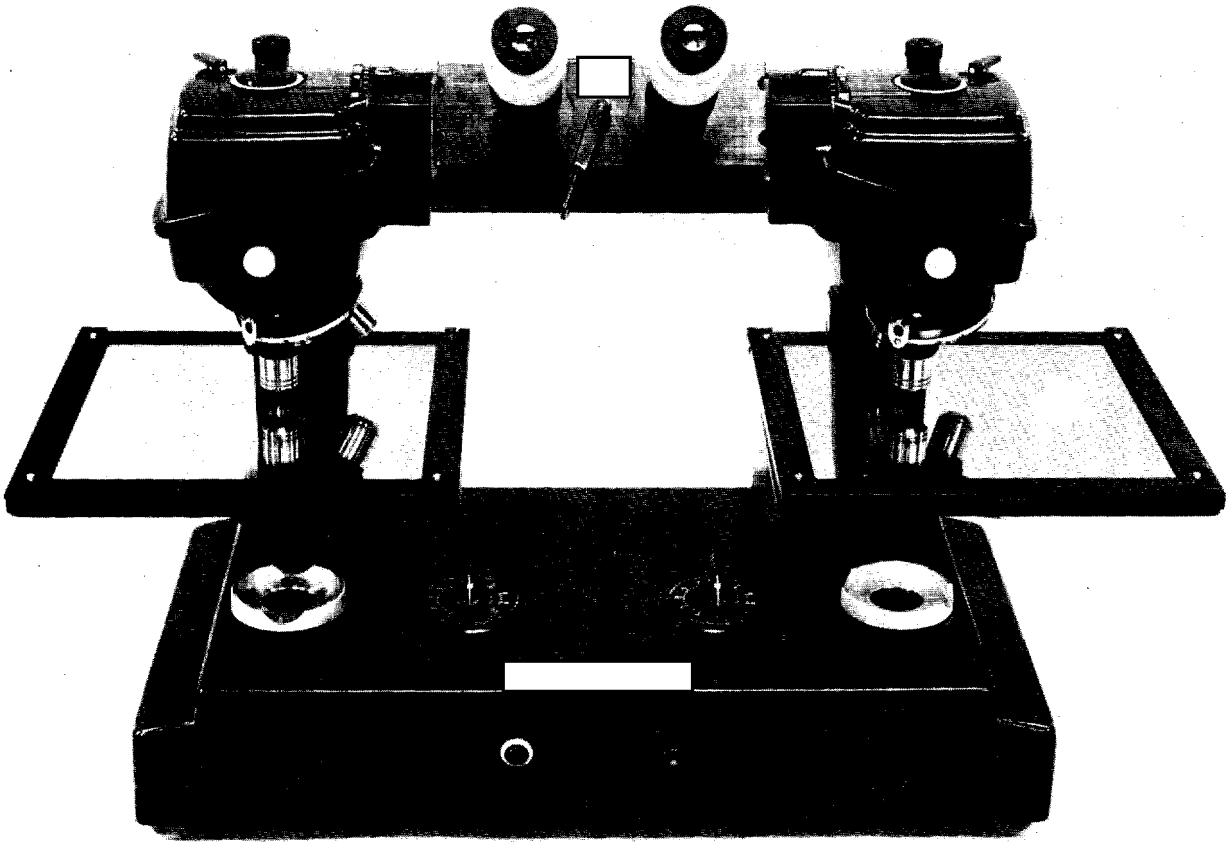
2. DESCRIPTION OF DEVICE

The glide stages and platens are shown in Figures 1 and 2. The black, ferrous metal platens which support the glide stages are attached to the HPSV stage drives in place of the original glass stages. The platens are 8 inches square overall and have a 2-7/8- by 4-11/16-inch opening to allow viewing over the full range of travel of the HPSV stage drives.

Each glide stage assembly is also 8 inches square. Each stage is three-eighths of an inch thick and consists of a sandwich of two glass plates attached to metal frames which are hinged along one edge. The bottom surface of the lower frame contains magnetic material for attraction to the ferrous platen. This is intended to prevent inadvertent movement of the stage on the platen and yet permit manual lateral positioning beyond the range of the x and y platen stage drives.

For each placement of film within the sandwich, a 6-5/8- by 6-5/8-inch area can be viewed compared to the 5- by 5-inch area provided by the original stages. Viewing over the full area is accomplished by orienting the stages manually on the platens and performing the fine motions with the existing stage drives. In this way, any point within the viewing area can be positioned under the microscope objective. The stages can completely enclose 6.6-inch-square chips and can handle roll film in widths up to 9.5 inches.

25X1

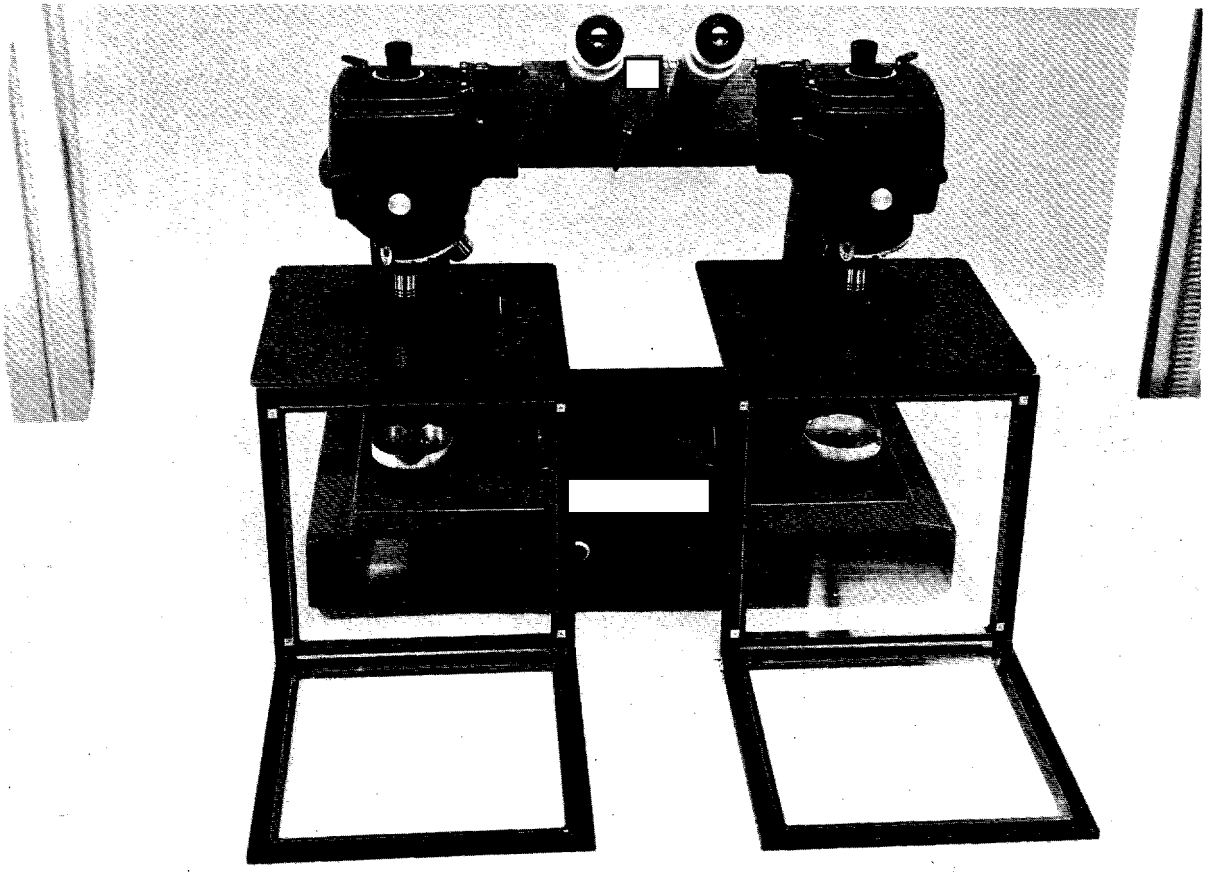


25X1

Figure 1.

25X1 [redacted] GLIDE STAGES AND PLATENS
25X1 MOUNTED ON A [redacted] HIGH POWER STEREOVIEWER

25X1



25X1

FIGURE 2.

25X1 [redacted] GLIDE STAGES AND PLATENS - GLASS SANDWICHES OPEN

3. TEST DETAILS

3.1 Acceptance Tests

(Reference: [redacted] The acceptance test details section describes the contractual specifications or design goals, test method, test result, and conclusion for each characteristic or quality listed in the contract. 25X1

Viewing Area

The stages will have a useful viewing area of 6-5/8 by 6-5/8 inches.

Test Method - The viewing area was measured with a steel rule.

Test Result

Length	6-5/8 inches
Width	6-5/8 inches

Conclusion - Conforms to the contractual requirement.

Design Configuration

The design shall be similar to that shown in the contractor's proposal dated 3 April 1972.

Test Method - Visual comparison and measurement.

Test Result - The glide stages and platens are similar to the configuration shown in the sketch, except that the opening in the platen measured 2-7/8 by 4-11/16 inches instead of 3 by 4-1/8 inches as indicated. The glide stage platens cannot be directly substituted for the original glass platens without an additional change. The original platens had a metal mounting lip at the rear edge which positioned them 0.049 inch above and parallel to the HPSV stage drives. This prevented contact between the movable top platen and the stationary bottom plate. The new platens had no such mounting lip and consequently had to be shimmed in the vicinity of the mounting screws before they could be properly mounted on the HPSV.

Conclusion - No adverse effect was noted due to the dimensional difference in the platen opening from that specified on the sketch. The platens cannot be properly mounted on the HPSV stages unless they are first shimmed.

High Contrast Resolution

When the stages are used as intended on a HPSV, an operator shall be able to read 900 cycles per millimeter on a suitable high contrast resolution target.

Test Method - On-axis resolution measurements were made with a USAF 1951 pattern test target of negative polarity, which is resolvable to 912 cycles per millimeter. The patterns resolved are listed as Tangential (T) and Saggital (S).

Readings taken using the left microscope without cover glass are also listed as a reference.

Test Results

TABLE 1. On-Axis Resolving Power Measurements (Cycles Per Millimeter)

*Test Condition	OBSERVER 1		2		3		Median Value	
	T	S	T	S	T	S	T	S
No Cover Glass	813	912	912	912	912	912	912	912
Left Glide Stage	813	912	813	912	912	912	813	912
Right Glide Stage	813	912	813	912	912	912	813	912

* Target read with left microscope.

Conclusion - The apparent loss in resolution due to the glide stage cover glass is too small to be detected with the available target. The loss in resolution of one target element, reported by Observer 2, can be attributed to degradation of the target pattern, since it is being read at its extreme upper limit of usefulness. Therefore, the resolution is judged to be acceptable.

3.2 Engineering Tests and Evaluation

Low Contrast Resolution

This was measured on axis with a low contrast USAF 1951 pattern test target with a maximum frequency of 323 cycles per millimeter. No decrease in resolution from the maximum was noted.

Brightness Attenuation

The apparent brightness of the microscope field was measured at the exit pupil of the HPSV with a [redacted] Photometer. Open gate readings were first taken with the original glass platen in place. They were taken again with the platen removed and the glide stages in place. 25X1 25X1

A reduction in brightness of 2.4 percent was recorded for the left stage and 3.7 percent for the right stage. This reduction is judged not to be excessive.

Field Curvature

There were no effects of field curvature noted which could be attributed to the introduction of the stage cover glass into the optical path.

Platen Alignment

The perpendicularity of the platens with respect to the optical axis could not be measured because the means for proper platen mounting was not provided. (Shims were used to approximate the correct alignment with the prototypes.)

Human Factors

The 6.6-inch-square film chips can be loaded without removing the glide stages from the platens. However, opening of the sandwich is restricted by the closeness of the microscope objective lens to the cover glass. At the highest HPSV magnification and with the glide stages all the way to the rear against the microscope post, the sandwich can be opened only about 0.4 inch at the front edge. Consequently, there is danger of cracking the thin cover glasses should the operator forget and apply excessive force in opening the sandwich. The need for some method to prevent this damage from occurring is indicated. Warnings, advising the operator to remove the stages from the platens before loading film, have been affixed to each stage as a temporary measure.

All sectors of the viewing area can be covered with the HPSV by taking advantage of the glide stages translation and rotation capabilities.

General

A force of approximately 1.5 pounds is required to overcome the combined forces of gravity and magnetism and to reposition the stages on the platens.

The hinge design permits easy uncoupling of the upper and lower frames. This is accomplished by loosening two screws on a retaining clip and sliding it forward. The upper cover glass can be easily removed from its frame by removing four clips and screws. The lower glass is held in place on its frame by an adhesive.

3.3 Operational Evaluation

The glide stages and platens were evaluated by five operating components within [redacted] 25X1

Two components reported that the stages performed satisfactorily, but that they presently have no need for the larger format.

Two components reported that they plan to procure glide stages for their HPSV's. One of them stated that their organization does not allow film chipping, but that the glide

stages might provide for easier and increased use of the HPSV for roll film. Their additional, significant comments follow:

- The glide stages perform adequately and meet all expectations. It simplifies the task of placing, orienting, and viewing film on the HPSV.
- The stages allow the use of smaller chips without the usual nuisance of holddown rings or separate glass platens.
- The stages allow the use of large chips.
- They allow easy and precise movement of chips without handling the film.
- It is easy to accidentally lift the cover glass with enough force to break the glass plate.
- The new stages still do not permit the use of full frames of the large format materials.

4. CONCLUSIONS AND RECOMMENDATIONS

The glide stages and their platens adequately permit the HPSV to accommodate or handle the larger film chip sizes.

A 0.049-inch-high mounting lip is needed on each platen to allow their proper mounting on the HPSV.

Some method is needed to restrict the opening of the glass sandwiches in order to prevent their damage.

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